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Mainly Money:

The Cause of Canadian Inflation

by

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The Bank of Canada's fight against inflation appears to be working

High interest rates and the strong Canadian dollar have again made monetary policy a subject of controversy. With consumer price inflation continuing to run over 5 percent and wage increases accelerating, some commentators have concluded that the Bank of Canada's fight against inflation is not working or cannot work. This Inflation Monitor *argues that, on the contrary, the links between Bank policies and inflation remain intact. After examining the longer-term associations in Canada between increases in the money supply, real economic growth, and changes in the inflation rate, the authors conclude that recent inflationary pressure in Canada can be traced back to the looseness of monetary policy around 1987. This effect may now be abating, which suggests that inflation will stabilize during 1990. Moreover, the tightness of monetary policy over the past year — as evidenced by the slow growth of M1 — is likely to be rewarded by declines in inflationary pressure into 1991. At the same time, however, the momentum of inflation, reflected in wage pressures, and the importance of containing inflationary expectations in the run-up to the introduction of the Goods and Services Tax, suggest that the Bank should maintain a cautious stance in the coming months, until it is possible to confirm that the recent slowdown of money growth is being sustained.*

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Introduction

Recent news that the year-over-year increase in the Consumer Price Index (CPI) remains over 5 percent serves as a reminder that inflation is still a problem in Canada. This experience may look good by comparison with the dismal performance of the 1970s and early 1980s. As Figure 1 illustrates, however, Canada experienced a significantly higher rate of inflation in the late 1980s than in the 15 years or so that followed the end of the Korean War.

Recent inflation is high relative not only to longer-term experience, but also to the Bank of Canada's stated objective of price stability.[1] This goal has been the subject of widespread controversy over the past year, as rising interest rates and a strengthening Canadian dollar have once again focused public attention on monetary policy. These and other factors — particularly accelerating wage settlements and the potential inflationary impact of the Goods and Services Tax (GST) on prices — have become objects of daily commentary and political debate. In fact, in the face of higher interest rates and a higher dollar, the persistence of inflation in excess of 5 percent has led some to suggest that current Bank policy cannot and will not work to bring inflation down.

This *Inflation Monitor* assumes that an inflation rate lower than Canada's current one is certainly desirable[2] and that, if the experience of the mid-1950s to the mid-1960s is anything to go by, it is feasible, too. Can current Bank policy achieve this goal? If it can, how long is it likely to take to get there? We address these issues by stepping back from the weekly and monthly developments that play such a prominent role in the debate, and by taking a longer-term look at monetary policy and inflation.

First, we argue that inflation must be understood as a long-run phenomenon — specifically, that inflation can only be understood with reference to the growth of the money supply relative to that of real economic activity over periods of years — and so we examine the Canadian historical record in this light. In the second part, we look at the shorter-run interactions between money growth, interest rates, fluctuations in real activity, and changes in prices, and we discuss the nature of the mechanisms that link money and inflation in Canada. This analysis is essentially similar to the monetarist view of inflation that, while more fashionable in the 1970s, still retains a great deal of its validity.

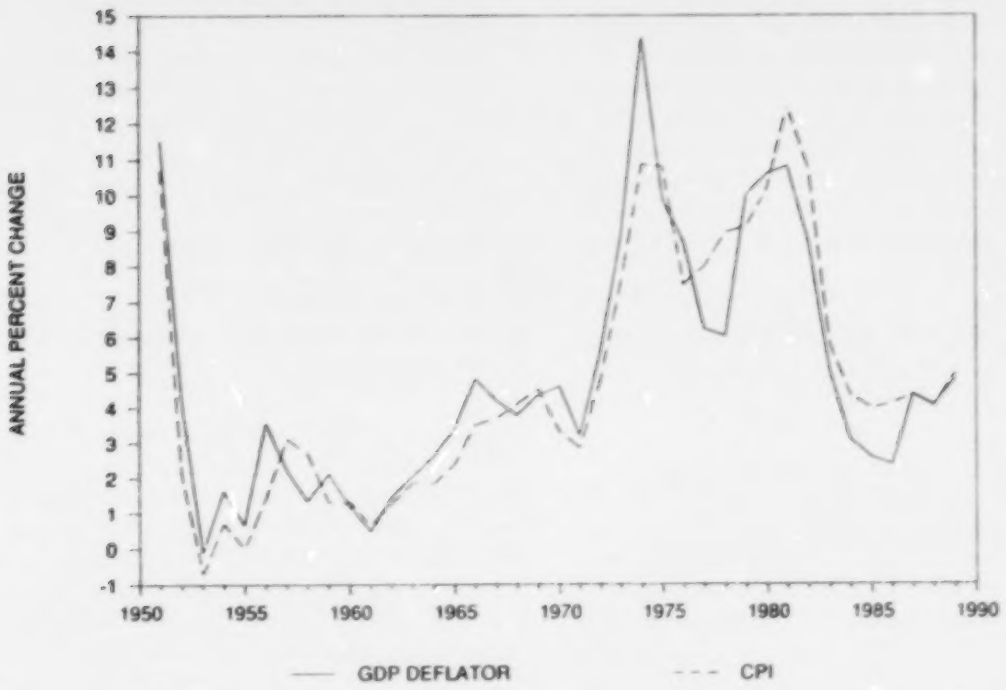
In the final section, we offer some comments about Canada's current inflation situation and the implications of this analysis for Bank of Canada policy. Our chief conclusion is that the Bank's policies are having effects that are not out of line with historical experience. Monetary policy can, of course, be thrown off course by shocks and surprises, but the Bank's restraint over the past year is likely to be rewarded with a diminution of inflationary pressure. This may occur at some time during the remainder of 1990, but more likely — and setting aside the possible short-term effects of the introduction of the GST — in 1991. (The issue of the origin of current inflationary pressure in Canada and the appropriateness of the Bank's current stance will be the subject of the next *Inflation Monitor*.)

The Long Run

Inflation — a process of generally rising prices — must be understood as a long-term phenomenon. Any rise in prices, over any period of time, may be called "inflation", but it is misleading to use the term so loosely. One-time events such as a frost in Florida or a sales tax increase can have significant, immediate, and readily observable effects on the cost of living. But paying too much attention to this type of shock carries the danger of misinterpreting a long-run process of rising prices, such as Canada's own experience since the mid-1960s, as nothing more than a series of numerous, unrelated, short-run shocks, and of overlooking a common element in the pattern — the rate of expansion of the money stock.

Figure 1

Inflation in Canada: The GDP Deflator and the Consumer Price Index, 1951–89



Source: Statistics Canada.

The Monetary Element in Inflation

The importance of money in the inflationary process is evident from the fact that "rising prices" is synonymous with "declining value of money". When economics deals with the value of anything, it does so in terms of supply-and-demand analysis, and money is no exception. To call inflation a "declining value of money" immediately suggests that the long-run path of money's value over time — that is, the inflation rate — may be understood in te ms of the interaction of the demand for money in the economy and the supply of it.

What Is Money?

Money can be thought of as consisting of those assets that are used for making payments of all sorts — as the economy's "means of exchange". These are, first, currency — coin and Bank of Canada notes — and, second, but of much greater quantitative significance, deposits in financial institutions that are readily transferable by cheque. Depending on the types of deposits taken into account, this definition of money can be represented in a variety of ways, two of the most common and familiar being M1 and M2.[3] As we shall see, the evidence shows that the behavior of these two measures, particularly that of M1, is highly relevant to our case.

The Demand for Money

Demand for money in the economy arises from the fact that any person, household, or business engaged in transactions requiring money

will keep an inventory of it on hand, in the form of currency in the pocket and a positive balance in the chequing account. This inventory will tend to fluctuate around some average value that is comfortable for its owner.

Applying abstract economic ideas to actual data inevitably produces a somewhat rough-and-ready result. But the many studies of the factors determining the demand for money do allow some reliable generalizations about what those factors are and about the nature of their influence.[4]

- On average, the demand for money rises with — though not necessarily in strict proportion to — the long-run average level of real economic activity.
- The demand for money varies in strict proportion to the general level of prices.[5] People hold inventories of money for convenience; if they are to maintain a given level of convenience when the price level changes, they must adjust their cash holdings accordingly.
- Since most types of money usually bear interest at rather low — in the case of currency, zero — and steady rates, the demand for money tends to vary inversely with the returns available on higher-yielding assets.

Demand, Supply, and the Value of Money in the Long Run

To understand the theoretical implications of these relationships, let us see how inflation behaves in the long run given two *alternative* sets of economic circumstances:

- In the first, suppose that real gross domestic product (GDP) is growing at 4 percent annually — giving rise to, say, a 4 percent increase in the demand for money — while the quantity of money is growing at 6 percent. If individuals and businesses are to absorb that money willingly into their cash inventories, prices must rise at 2 percent annually. In other words, 4 percentage points of the rate of growth of money will go to satisfy demands for cash stemming from real income growth, and the remainder will need a 2 percent inflation rate to see it absorbed.
- In the second case, suppose that real GDP is again growing at a 4 percent rate, but the quantity of money is growing more rapidly — at, say, 10 percent annually. Then, the public will willingly absorb the growing stock of money into its inventories only if inflation is running at 6 percent.[6]

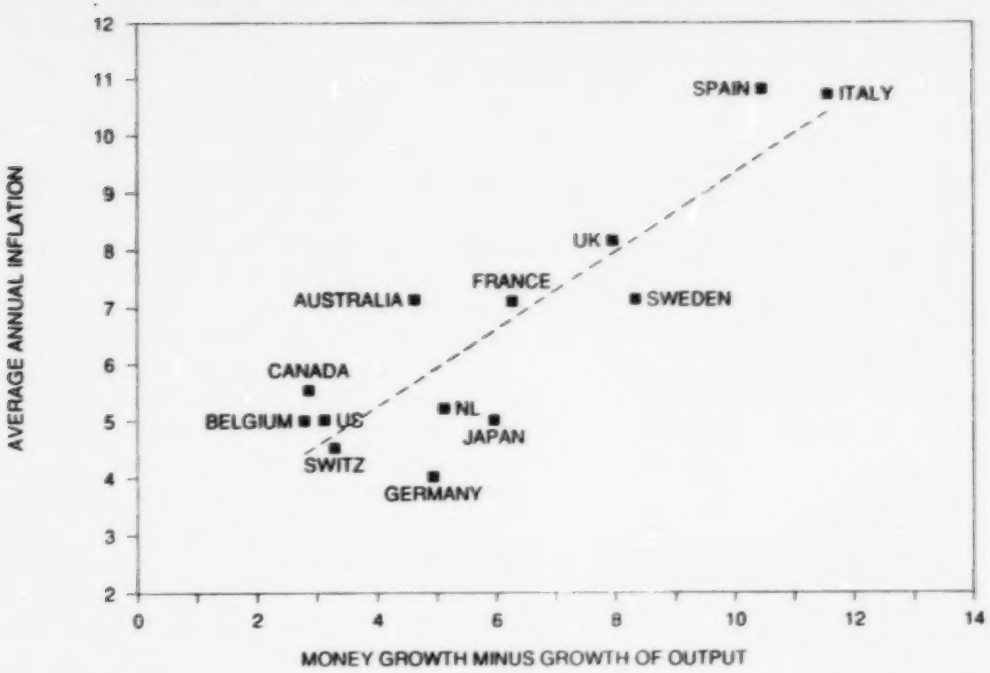
International Evidence on Money Growth and Inflation in the Long Run

There is, in fact, no reason to believe that the demand for money grows in strict proportion to real activity. In Canada, the demand for narrowly defined money, M1, tends to grow more slowly than real GDP, and the demand for more broadly defined M2 tends to grow more rapidly. Nevertheless, this theoretical reasoning yields predictions that are broadly consistent with actual experience.

Figure 2 illustrates this, drawing on the experience of the 13 largest OECD countries over the 1960–88 period. The average annual inflation rate of each country during those years is represented by the country's position on the vertical axis, while its position on the horizontal axis shows the difference between the average annual growth of money (M1) and growth of real GDP — a difference that can be thought of as "excess" money growth — during the same period. The tendency for countries with low excess money growth — such as Belgium and Switzerland — to have low inflation, and countries with high excess money growth — such as Spain and Italy — to have high inflation is clear from the figure. The use of statistical techniques to fit a line through the points in the diagram reveals that the relationship between inflation and excess money growth, while not one of strict one-to-one proportionality, is reasonably close to it, while the probability that the positive relationship displayed in Figure 2 has arisen by chance is to all intents and purposes zero.

Figure 2

Excess Money Growth and Inflation in 13 Major OECD Countries, 1960–88*



*Data for Italy and Sweden are for 1960–87.
Source: International Monetary Fund.

The Canadian Experience

The long-run association between excess money growth and inflation in Canada over time is displayed in Figure 3. The measures in the figure are rates of change averaged over overlapping five-year spans in order to smooth out the effects of temporary shocks.

The profile over time of excess money growth (measured either by M1 or M2, but more obviously by the latter) is broadly similar to that of inflation, with excess M2 growth generally running a little above inflation, and excess M1 growth a little below. These relationships occasionally shifted — there was, for example, a large, temporary gap in the case of M1 around the beginning of the 1980s, while there was also a sharp fall in M2 demand in 1983–84.[7] Even so, the long-run relationships revealed in Figure 3 are broadly consistent with a monetary explanation of inflation in Canada. Canadian experience tends to confirm the long-run relationship between money growth and inflation suggested by theory and international evidence. The relationship is not mechanically precise, but it is persistent.

The Short Run

While the long-run relationship between money growth, real economic activity, and inflation seems relatively straightforward, shorter-run interactions are more complex.

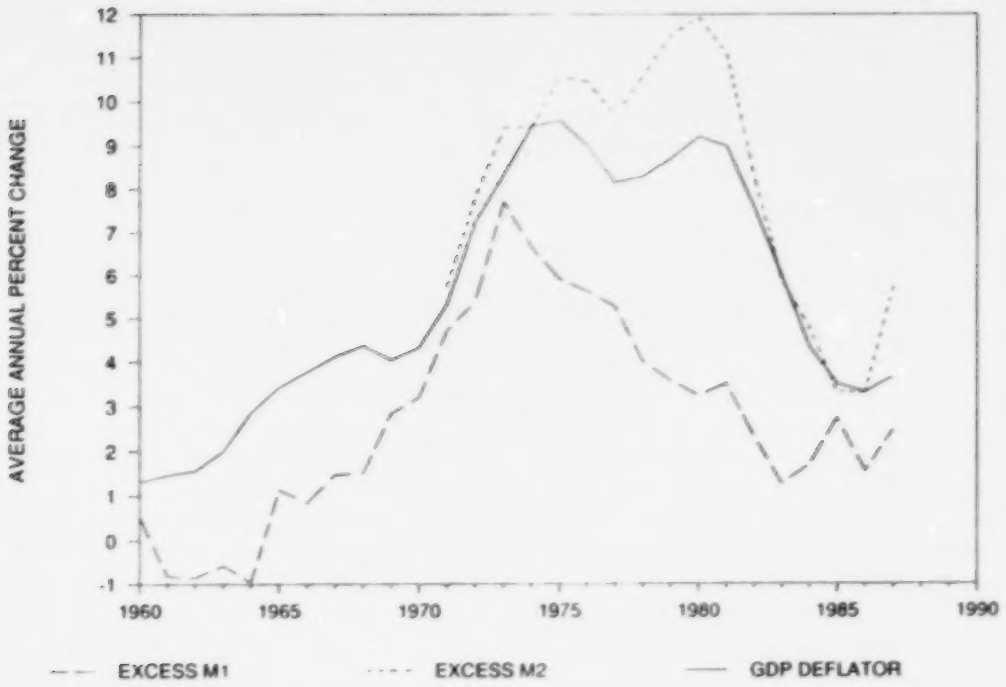
A Change in the Rate of Money Growth

It is useful to start a discussion of short-run relationships by returning to the earlier ab-

Figure 3

Excess Money Growth and Inflation

(Five-year spans, centered)



Sources: Bank of Canada; Statistics Canada.

stract example of two economic scenarios. This time, however, instead of comparing alternative situations, consider *successive* situations, in which the central bank switches to an easier monetary policy by increasing its supplies of liquidity to the banking system from a rate consistent with money growth of 6 percent annually to a rate consistent with 10 percent money growth.

Immediately after this change, with the growth of real output running at 4 percent and inflation at 2 percent, unwanted inventories of cash begin to accumulate, first in the hands of financial institutions, and subsequently in the hands of individuals and nonfinancial businesses. When financial institutions, individuals, and businesses have more cash on hand than they require, they tend to lend it out or to spend it on newly produced goods and services. Thus, the immediate impact of easier monetary policy tends to be downward pressure on interest rates (particularly short-term rates) and a boost to demand for, and hence output of, goods and services.

The extent and timing of these effects will be determined by the degree of slack in the economy when the money growth rate picks up. At some point, which may be delayed for several quarters, or even a year or two, pressure on available resources will start to drive their prices up. Eventually, after a transition that might take five years to be completed (and during which inflation is likely to rise temporarily above 6 percent), this pressure will be relieved when prices are rising at a rate that puts *desired* holdings of money back on a track compatible with *actual* money growth — that is, when real growth is back at 4 percent and inflation is at 6 percent. The same process works in reverse when monetary policy is

tightened with temporarily rising interest rates (particularly short-term rates) and temporarily falling output preceding the achievement of lower inflation.

Sales Tax Increases

Of course, not all shocks to prices come from changes in monetary policy. They can also originate on the supply side of the economy, as in the case of a sales tax increase. The first-round effect of such an event will be to increase the prices of the goods involved and, as a result, the general price level — an effect that will be highly visible. As far as the ultimate influence of the tax increase is concerned, however, less visible second-round effects will be of more importance. What those are will depend on the response of the central bank.

Suppose that, at the moment the tax is introduced, the public is just satisfied with its inventories of money. This satisfaction will be short-lived, because the upward boost given to prices by the tax will render those inventories inadequate, and the public will respond to this liquidity shortage by attempting to restore holdings of cash to a more comfortable level. If the central bank maintains the existing growth rate of money, both lending and spending will be cut. The resulting dampening of demand will generate downward pressure on prices — not necessarily absolutely, but certainly relative to where they would otherwise have been. In this case, the ultimate consequences of the tax will be lower prices for untaxed goods, higher market prices for taxed goods, and no final overall effect on the general price level.

In short, the obvious upward pressure of prices from the tax increase will be followed by more diffuse counteracting downward pressure and will, therefore, be irrelevant in the long-run behavior of the inflation rate.

This outcome is, however, crucially dependent on the supply of money not rising in response to the initial price increase. If the public can restore its cash inventories to a comfortable level from money newly created for that purpose as a result of central bank actions, then the second-round effects arising from the liquidity shortage will not take place. An effect that would have been reversed in the absence of monetary accommodation will persist in its presence (see Box 1).[8]

Box 1

Monetary Policy and the GST

This discussion of sales tax increases is directly relevant to the expected introduction of the GST. If monetary policy fails to accommodate the new tax, its effects on the price level will be temporary. However, the GST would then put downward pressure on the level of demand in the economy and would tend to generate a slowdown in real activity. Because the economy is already showing some signs of weakness, and because the GST is clearly a once-and-for-all event, it would be wise to accept the small (1¼ percent, according to the Department of Finance) increase in the level of the CPI that a monetary accommodation of the GST would imply. We would not, however, condone the further accommodation of wage increases for individuals who would seek to avoid bearing their share of the GST burden. As we note below, though, such accommodation will be hard to calibrate with any precision.

Other Price Shocks

The argument made here about tax-related shocks can also be applied to supply-side shocks in general. Any supply-side shock that tends to move the price level upwards independently of demand-side influences will have short-lived effects if it is not accommodated by a change in the money supply. For instance, if someone with a monopoly on labor or goods and services in a particular market attempts to raise selling prices, this will have a first-round impact on the general price level. If this impact is not accommodated, the resulting shortage of liquidity in the economy will ensure that, in the longer run, the monopoly's efforts — though they might raise the relative price of what the monopoly is selling — will have no effect on the overall level of prices. If

the attempt is fully accommodated by an increase in money growth, however, its effects will be permanent.

It should also be noted that monopolies will be less eager to press for inflationary wage and price increases when the central bank takes a nonaccommodative stance. Even a monopoly loses sales when it increases its price unless demand simultaneously expands. Demand is unlikely to expand (except by coincidence) in the absence of monetary accommodation, and the prospect of lost sales will then act as a deterrent to such behavior — that is, cost-push inflationary impulses are less likely to occur when the central bank has made it clear that it will not accommodate them.

Finally, it should be noted that, in practice, it is impossible to calibrate monetary policy sufficiently finely to accommodate exactly, or offset completely, supply-side shocks. The best that the central bank can do is attempt to lean more or less in one direction or the other. This imprecision is one important reason why, on a quarter-by-quarter or even year-by-year basis, the inflation rate can fluctuate around a trend set by the longer-term average stance determined by the central bank.

Demand-Side Shocks

Numerous nonmonetary factors can have an upward impact on demand in the economy, and hence on prices. These factors might include a rise in business confidence that leads to increased investment expenditure; a fall in the household saving rate accompanied by higher consumer spending; or an increase in government expenditure. Again, however, short- and long-run effects have to be kept distinct. Such an impulse may begin to pull the price level upwards, but if the central bank does not allow the quantity of money in circulation to grow in response, a liquidity shortage will develop. Interest rates will then be pulled up, the overall level of demand in the economy will be brought back into line, and so, too — after a time — will prices.[9]

Shocks and Transitions in Canada

How does this theoretical discussion of shorter-run interactions square with Canadian experience? Data since the early 1970s show that the links between money growth and inflation discussed here are indeed visible. In particular, changes in the growth rate of M1 are associated with systematic variations in interest rates; both of these precede variations in output; and variations in output, in their turn, precede changes in inflation.[10]

Measuring the Tightness of Money

Looking at short-run interactions between money growth, interest rates, and output in Canada first requires a summary measure of the stance of monetary policy. Whether a particular rate of money growth in the short run represents tight or easy money depends on how the demand for money is growing. For this reason, it is useful to look not just at the current growth rate of money, but at the gap between it and the growth rate of demand for money, which may be measured in a rough-and-ready way by the growth rate of nominal spending in the economy, or nominal GDP.

In any three-month period, it seems reasonable to take the behavior of nominal GDP as largely determined by previous decisions on real spending and by continuing inflationary inertia as well as occasional price shocks of nonmonetary origin. If the quantity of money supplied during the quarter grows faster (slower) than the demand for it, as measured by the expansion of nominal GDP, this will put downward (upward) pressure on interest rates. The differential between the growth of money and the growth of nominal GDP can be termed the "money-growth gap".

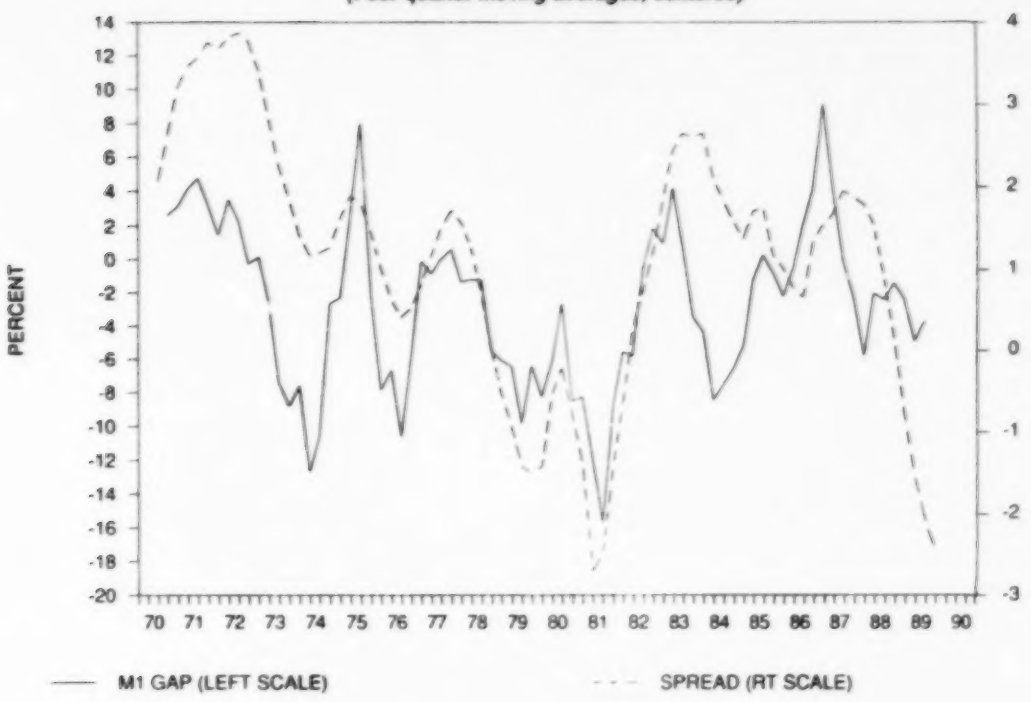
Measuring Interest Rates

A second measurement issue arises with respect to interest rates. As already noted, the effects of easy or tight money on interest rates are particularly marked at the short end of the

Figure 4

The M1-Growth Gap and the Yield Spread, 1970–89

(Four-quarter moving averages, centered)



Sources: Bank of Canada; Statistics Canada.

interest-rate spectrum. There are two main reasons for this. First, the Bank of Canada implements its policies by varying the amount of cash reserves available to the banking system, a procedure that produces direct and immediate effects on short-term interest rates. Second, longer-term rates are affected not just by current policy, but by expectations of the future path of short-term rates and by expectations about the future value of the exchange rate. (These, in turn, are partially conditioned by expectations about the future effects of current policy and about future policy itself.) As a result, long-term rates tend to vary in a narrower range than — and sometimes even in an opposite direction to — short-term rates.

In addition, many factors other than current money growth affect the general level of interest rates, both short- and long-term. The current and expected future profitability of investment, the current and expected inflation rate, and the level of world interest rates are all important. To the extent that these other factors influence both short- and long-term rates, it is helpful to try to isolate the impact of monetary policy on interest rates by considering not the absolute value of short-term rates, but their value relative to long-term rates. This can be done by looking at the difference between a representative short-term rate of interest (three-month treasury bills) and a representative long-term rate (average yields on long-term government bonds).

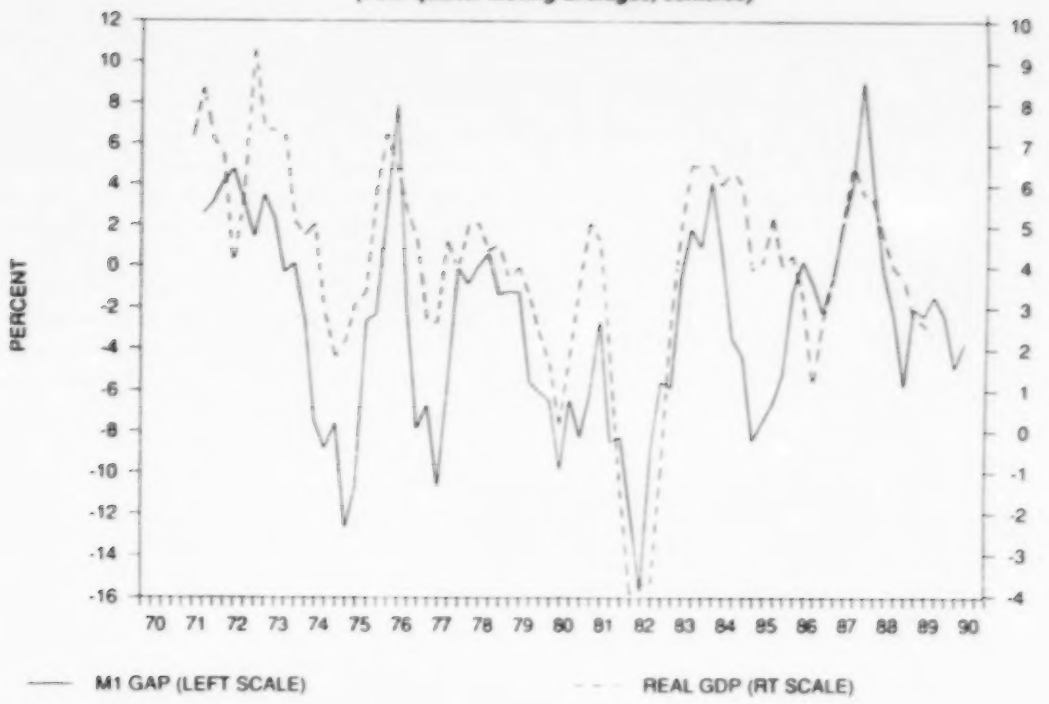
The Links Between Money, Interest Rates, Output, and Inflation

Figure 4 illustrates the "M1-growth gap" — that is, the rate of growth of M1 relative to

Figure 5

The M1-Growth Gap* and Real Output Growth, 1970–89

(Four-quarter moving averages, centered)



* The M1 gap is advanced three quarters.
Sources: Bank of Canada; Statistics Canada.

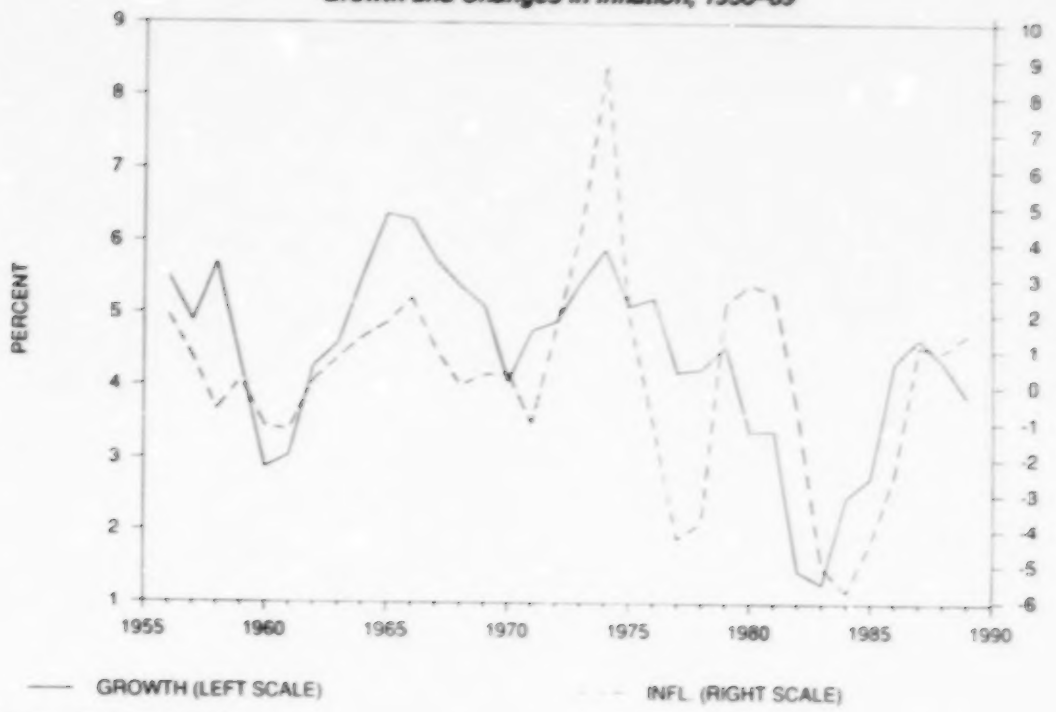
growth of nominal GDP — and the spread between long- and short-term interest rates from 1970 to 1989. It confirms that the predicted relationship between the interest-rate spread and the money-growth gap, though far from being mechanically precise, is present.

What about the next step — the short-run relationship between money and output? Figure 5 shows the M1-growth gap and real output growth over the same period. In this relationship, real GDP lags behind money by approximately three quarters (in the figure, the money gap is advanced three quarters), an effect which is easier to reconcile with our view that the cause runs mainly from monetary factors to real activity than with a possible opposite view — that the cause runs mainly from activity to money.

The final link in the chain, which brings the analysis back into contact with the long-run relationship discussed earlier, is the connection between real output and inflation. Canadian experience, illustrated in Figure 6, demonstrates that the more vigorous is real GDP growth, the stronger is the tendency for inflation to accelerate, while the reverse is true in periods of weak or negative growth. In this figure, output growth is measured by four-year averages, and changes in the rate of inflation are represented by the difference between this year's rate of inflation and the average rate over the preceding four years.[11] There is thus implicit in the figure an average lag of about 18 months between changes in the pressure of demand as measured by output growth and changes in inflation.

Figure 6

Growth and Changes in Inflation, 1956–89



Source: Statistics Canada.

As noted earlier, it is apparent that many factors other than demand pressures can cause the inflation rate to fluctuate around its longer-run trend. In particular, the rapid increases in inflation that took place in the 1973–74 and 1979–81 periods were well in excess of what might have been expected on the basis of GDP growth, and owed much to the energy price increases of those years. It is also apparent that the 18-month time lag implied by these figures does not hold true mechanically at all times. In the early 1980s, the inflation rate seems on average to have reacted more slowly to changes in output.

Completing the Picture: M1 as the Leading Indicator

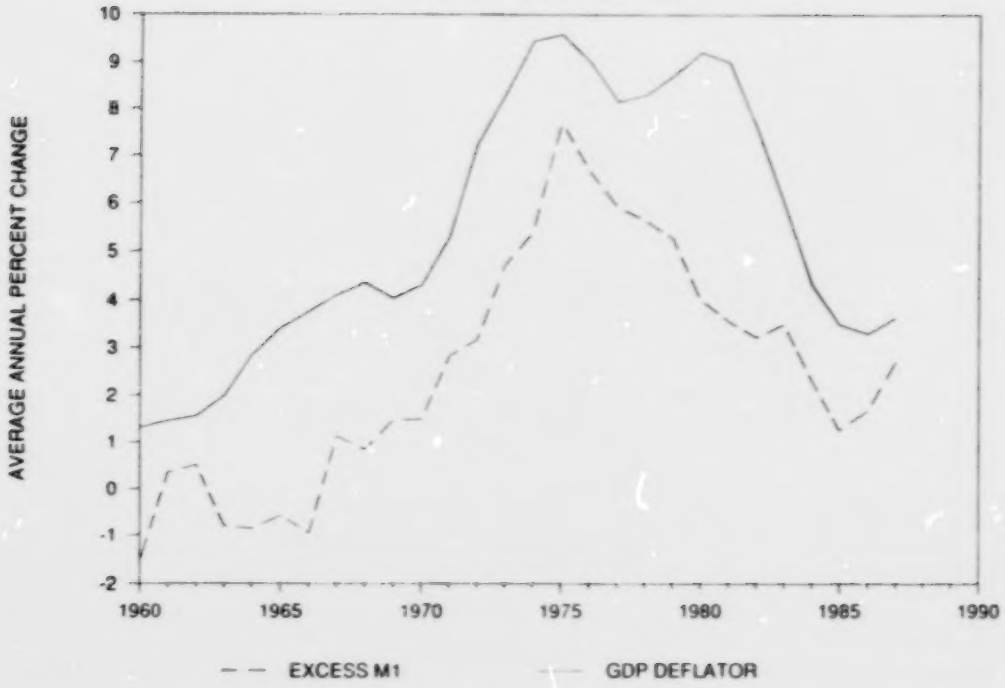
If there is a lag of about three quarters before changes in the stance of monetary policy affect output, and a further lag of about 18 months before the inflation rate begins to change, it follows that it takes two years or more for changes in money growth, as measured by M1, to have a marked impact on the inflation rate. But the earlier discussion of the long-run relationship between money growth and inflation in Canada referred to no such lag, whether for M1 or for M2. A crude test, then, of our account of the short-run mechanisms linking money to inflation is to introduce a two-year time lag into the data on the M1-inflation link, and to see whether doing so improves the correlation between the two.

Figure 7 does this. Comparison with Figure 2 reveals that excess M1 growth is more closely linked to inflation when a two-year time lag is allowed for than when the relationship is treated as simultaneous. This is not, however, the case for excess M2 growth. Here, the

Figure 7

Excess M1 Growth* and Inflation

(Five-year spans, centered)



* Excess M1 growth is advanced two years.
Sources: Bank of Canada; Statistics Canada.

closest relationship appears to be contemporaneous — that is, broadly defined money is related to current spending in the economy, but does not lead it.[12] Narrower M1, on the other hand, gives an early warning of inflation with a two-year lead. Indeed, our discussion suggests that M1 growth should probably be seen as a key factor causing inflation.[13]

The warning conveyed by M1 is, however, a rough-and-ready one. To begin with, Figure 7 again shows the influence of the shift in the M1 growth-inflation relationship of the early 1980s. For three or four years between 1980 and 1984, M1 was an unreliable indicator of the thrust of monetary policy. The fact that such an event occurred in the past warns that institutional changes in banking might alter the relationship again.

Setting this particular problem aside, it is also important to remember that the data plotted in Figure 7 are five-year averages. A great deal of shorter-term variability can be, and indeed is, hidden within them. The relationship portrayed does suggest that, if the Bank of Canada is serious about controlling the long-run inflation rate, it would be wise to pay particular attention to keeping M1 growth down. But it does not guarantee that a policy of keeping M1 on about a 3 percent growth path will be sufficient to keep CPI inflation constant at about 1 percent on even a year-by-year basis.

At best, one might hope that such a policy would keep the inflation rate on a path that fluctuates around 1 percent on average over long periods of time, but that might well vary

Table 1

Recent Changes in Money and Prices

(percentage change, at seasonally adjusted annual rates)

	1987	1988	1989	1989/Q1	1989/Q2	1989/Q3	1989/Q4	1990/Q1
Money								
M1								
quarter-over-quarter change	—	—	—	6.1	0.9	1.0	4.9	-4.3
year-over-year change	12.9	6.1	4.6	7.3	5.6	2.5	3.2	0.6
M2								
quarter-over-quarter change	—	—	—	14.5	11.6	12.5	17.5	12.8
year-over-year change	10.1	7.6	13.1	12.4	13.0	12.9	14.0	13.6
Inflation								
Consumer Price Index								
quarter-over-quarter change	—	—	—	5.3	6.1	5.8	3.6	6.1
year-over-year change	4.4	4.1	5.0	4.5	4.9	5.2	5.2	5.4
GDP deflator								
quarter-over-quarter change	—	—	—	6.9	3.5	4.1	3.7	n.a.
year-over-year change	4.4	4.1	4.8	4.9	5.1	4.8	4.5	n.a.

Sources: Bank of Canada; Statistics Canada.

by two or three percentage points on a year-to-year basis — and even more on a quarter-to-quarter basis. This result is hardly exciting, but in the current state of knowledge it does not seem possible to count on monetary policy to deliver more. Exciting or not, such an outcome would be a great deal better than any that Canada has experienced since the early 1960s.

The Current Situation

Despite the qualifications we presented earlier — the looseness of the long-run link between money growth and inflation, and the variable lags between changes in M1 growth, changes in output growth, and changes in inflation — it is possible to make some tentative comments about Canada's current situation.

To begin with, if the growth rate of M1 is held at about 3 percent annually over time, and there are no further shifts in demand for M1 such as took place in the early 1980s, inflation is likely to move toward and fluctuate around an average value, based on the CPI, of about 1 percent. Allowing for biases in the measurement of inflation with the CPI, this figure would be consistent with long-run average price stability.

If this is so, common perceptions that monetary policy has been tight for a number of years are simply false, as Table 1 shows. Only since the beginning of 1989 has M1 growth been systematically within a range compatible with the Bank of Canada's stated policy goals. M2, however, has continued to grow considerably faster than the 5 percent average rate that past evidence suggests is compatible with an average inflation rate around 1 percent. Even allowing for the recent buoying effect of Canada Savings Bond (CSB) redemptions on the behavior of M2, it seems that the effects of tighter monetary policy are not yet evident in this measure. (They may just now be appearing, however: figures for March 1990 show a drop in M2 that month, the first non-CSB-related decline in over four years.)

Given the existence of a two-year average lag between M1 growth and inflation, and given that M2 growth tends to vary simultaneously with the total value of spending, it is too early to expect the tighter policy of the past year to be having an effect on the inflation rate. This observation is borne out by the recent behavior of the CPI and the GDP deflator. There is little evidence, behind the quarterly swings in these indicators, of any change in the underlying trend of inflation.

It is worth stressing again that the lags between M1 growth and inflation are too long for Canada's current inflation rate to be the result of policy over the past 12 months. In fact, recent inflation has been somewhat lower than might have been expected, given the stance of policy two or more years ago; and since M1 growth only came within a reasonable range during 1989, Canadians will be lucky to see any marked improvement before the end of 1990.

This conclusion is, of course, premised on nothing changing to disturb relationships that have usually ruled in the past. Given the inevitably sketchy nature of evidence on recent developments, this is a strong assumption. Thus, in the past year, the negative spread between long- and short-term interest rates has grown larger than the slow growth of M1 would suggest (see Figure 4). At the same time, M2 has been growing unusually rapidly. The former fact might indicate that policy is actually tighter than inspection of M1 growth alone would indicate; the latter that it is looser. Only the passage of time will reveal for sure which, if either, of these possibilities is correct.

For the moment, it appears that continued progress in the fight against inflation is most likely if the Bank of Canada continues with policies designed to keep M1 on a growth track averaging about 3 percent annually. This will not be an easy policy to pursue from a political point of view, not least because it is unlikely to bear fruit in the shape of a visible reduction in the inflation rate for at least another year. Meanwhile, it will probably continue to slow economic growth and perhaps contribute to the onset of a contraction. Only when inflation and M2 growth have started to fall, and are clearly seen to be falling, might some short-term increase in M1 growth be permitted to accommodate the increased demand for M1 that lower inflation and, hence, lower interest rates are likely to generate, but the time for that has not yet arrived.

The case for keeping policy on such a course is made even stronger by the fact that current inflation is actually somewhat lower than might have been expected, given the stance of monetary policy from mid-1986 through 1988, and also by the fact that wage settlements appear to be adding to the momentum of inflation. Any tendency to relax monetary policy at the moment, then, carries with it an unusually large risk of causing the inflation rate to rise.

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Notes

1 As a practical matter, the Bank's target probably ought to be translated into an annual CPI increase of between zero and 2 percent, with an average value of about 1 percent. See Pierre Fortin, "Do We Measure Inflation Correctly?" in Richard Lipsey, ed., *Zero Inflation: The Goal of Price Stability*, Policy Study 8 (Toronto: C.D. Howe Institute, 1990).

2 A wide-ranging exploration of the negative consequences of inflation can be found in Peter Howitt, "Zero Inflation as a Long-Term Target for Monetary Policy," in ibid.

3 M1 consists of currency and Canadian dollar demand deposits — that is, current and personal chequing accounts at chartered banks — adjusted for private-sector payments (mostly cheques) in transit. M2 is equal to M1 plus personal savings deposits and non-personal notice deposits, some of which are not, in fact, highly liquid. Since the bulk of the following analysis concentrates on M1, this anomaly is not crucial here.

4 The relevant evidence, as it stood in the mid-1980s, is summarized in David Laidler, *The Demand for Money: Theories, Evidence and Problems* (New York: Harper and Row, 1985). A more recent representative group of studies will appear in a special number of the 1990 volume of the *Journal of Policy Modelling* entitled "Understanding Velocity — New Approaches and their Policy Implications."

5 The reference here is to the level of prices, not their rate of increase. Inflation tends to reduce the demand for cash inventories because it drives up interest rates, with the effects noted in the next bullet.

6 In this second case, the higher interest rates associated with higher inflation can be expected to cause desired inventories of money to be smaller than in the first case. At rates of inflation in the current range in Canada, this effect is likely to be rather small and for the sake of clarity we neglect it in most of this *Inflation Monitor* (see, however, the penultimate paragraph).

7 These downward shifts in the demand for M1 and M2 show up in the figure as faster declines in the lines representing excess money than in the inflation rate. In the case of M1, two important innovations — cash management accounts and daily interest chequing accounts — acted to depress demand during the 1978–83 period. In the case of M2, the Bank of Canada has interpreted the 1983–84 fall as the result of a major effort by households and businesses to pay down debts in the wake of the 1981–82 recession. See "Monetary Aggregates: Some Recent Developments," *Bank of Canada Review*, January 1985.

8 Moreover, if this first-round price increase itself engenders a desire on the part of workers to be compensated for its effects, if expectations of further increases in the future translate into upward pressure on wages, if this upward wage pressure is passed on to prices, and if this upward price pressure is in turn accommodated by further money supply increases, then a single tax increase can be the starting point for an ongoing inflationary spiral. Nevertheless, such a spiral could not persist without monetary expansion, and thus in an important sense may be said to be caused by it.

9 This is not to say that, in any of the above cases, there will be no consequences. The effect on interest rates of an increase in one component of expenditure — that of the government, for example — will cause other components to shrink, so the composition of output will change, an effect known as "crowding out". The upward pressure on interest rates will be accompanied by a tendency for the exchange rate to appreciate, so that some of the crowding-out effects will fall on producers of tradable goods and services. As far as the long-run average value of the inflation rate is concerned, however, these effects do not matter: changes in particular components of aggregate demand that are not accompanied by sustained changes in the rate of money growth will cause, at most, short-run variations in the price level, but will not affect its long-run behavior.

10 There are also side effects on the exchange rate. The role of the exchange rate in the Canadian policy nexus is complex, and will be the subject of a future *Inflation Monitor*. Its omission here reflects a judgment that, in Canada, the behavior of the exchange rate is not crucial to the interaction of money and inflation so long as the exchange rate is largely market-determined, moving to reconcile domestic developments with events in the economies of Canada's trading partners.

11 This use of rather long average periods reflects the view that demand pressure works through output to affect inflation only rather slowly. The chain of cause and effect could be described in more detail, by adding explicit links running from output to industrial capacity utilization and employment, and from there through intermediate prices and wages to final selling prices.

12 The utility of M2 as a guide is impaired, however, by the fact that the demand for M2 is affected by sales and redemptions of CSBs, since investors tend to shift their savings back and forth between CSBs and bank accounts included in M2 depending on the relative attractiveness of the interest rates offered. For this reason, judgments about the significance of movements in M2, especially around the period of the annual CSB sales campaign in November, have to be made with caution.

13 The two-year lead of M1 and the contemporaneous relationship of M2 to total spending in the economy is consistent with the results of more formal statistical analysis. See D. Hostland, S. Poloz, and P. Storer, *An Analysis of the Information Content of Alternative Monetary Aggregates*, Bank of Canada Technical Report 48 (Ottawa, October 1987).

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